```
#The following code take as input the equation defining a hyperelliptic curve and returns as output the
#corresponding tau function according to Sato's formulation
restart :
hyp := (x - 1)·(x - 1 - e)·(x - 2)·(x - 2 - e)·(x - 3)·(x - 3 - e) :
#hyp := (x + 1 + e) * (x + 1 + 2 * e) * (x + 1 + e + e^2) * (x + 1 + 2 * e + e^2) * (x + 2 + e) * (x
    + 2 + 2 * e) * (x + 2 + e + e^2) * (x + 2 + 2 * e + e^2) :
#hyp := (x - 1) * (x - 1 - e) * (x - 2) * (x - 2 - e) * (x - 3) * (x - 3 - e)·(x - 4)·(x - 4 - e)·(x
    - 5)·(x - 5 - e) :
d := degree(hyp, x) :
x := 1/z :
y := (expand(factor(hyp * z^d)))^(1/2) :
#Compute the series expansion of y
M := 4 :        #order of e to appear
N := 20 :
S := mtaylor(mtaylor(y, e, M), z, N + d/2) :
n := d/2 :
m := n - 1 :
#define the array α of the coefficients α_i
 α := Array(0 ..N + n + m) :
  α[0] := 1 :
 for i to N + n do
       α[i] := factor(coeff(S, z, i))
 end do:

 #define the array of the functions g_n,...,g_(N+n+m)
 g := Array(1 ..N + n + m) :

 for i to N + n do
       for j to i + n do
                   g[i + m] := α[j - 1]·x^(i + n - j) + g[i + n - 1]
                end do:
 end do:
 #define the array of the functions f_n,...,f_(N+n+m)
 f := Array(1 ..N + n + m) :

 for i to N + n do
       f[i + m] := expand(factor(1/2·(x^(i + m)·y + g[i + m])·z^(i + m)))
 end do:

 #define the array with the series expansions of the functions 1, f_n,...,f_(N+n+3)
Cmatrix := Array(1 ..N + n + 1) :
Cmatrix[1] := taylor(z^m, z, N) :
for i to N + n do
        Cmatrix[i + 1] := mtaylor(mtaylor(f[i + m], e, M), z, i + 1 + N + m)
```

end do:

#compute the matrix corresponding to the frame{1, fn,..., f_(N + n + m)}

$\xi := (i, j) \rightarrow factor(coeff(Cmatrix[N + n + 2 - j], z, i - j)) :$

$A := Matrix(2 \cdot (N + n), N + n + 1, \xi);$

$numRows := 2 \cdot (N + n) + 1 :$

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$$A := \begin{bmatrix} 1 & 0 & 0 & 0 \\ -6 - \frac{3e}{2} & 1 & 0 & 0 \\ 11 + 6e + \frac{3}{8}e^2 & -6 - \frac{3e}{2} & 1 & 0 \\ \frac{(4+e)(e^2 - 16e - 24)}{16} & 11 + 6e + \frac{3}{8}e^2 & -6 - \frac{3e}{2} & 1 \\ -\frac{3e^2}{8} & \frac{(4+e)(e^2 - 16e - 24)}{16} & 11 + 6e + \frac{3}{8}e^2 & -6 - \\ -\frac{3e^2(4+e)}{16} & -\frac{3e^2}{8} & \frac{(4+e)(e^2 - 16e - 24)}{16} & 11 + 6e \\ -\frac{e^2(8+3e)}{4} & -\frac{3e^2(4+e)}{16} & -\frac{3e^2}{8} & \frac{(4+e)(e^2 -}{16} \\ -3e^2(e+2) & -\frac{e^2(8+3e)}{4} & -\frac{3e^2(4+e)}{16} & -\frac{3}{8} \\ -\frac{e^2(37+24e)}{2} & -3e^2(e+2) & -\frac{e^2(8+3e)}{4} & -\frac{3e^2(}{1} \\ -\frac{e^2(228+185e)}{4} & -\frac{e^2(37+24e)}{2} & -3e^2(e+2) & -\frac{e^2(8}{4} \\ \vdots & \vdots & \vdots & \vdots \end{bmatrix}$$

$partLength := 8 :$

$p = Array(1 ..partLength) :$

for *i* **to** *partLength* **do**

$p[i] := 0$

end do:

$n1 := 0 : n2 := 0 : n3 := 0 :$

for *i* **to** *partLength* **do**

for *n1* **from** 0 **to** *i* **do**

```
            for n2 from 0 to i do
                for n3 from 0 to i do
                    if n1 + 2·n2 + 3·n3 = i then
                        p[i] := p[i] + (X^n1·Y^n2·T^n3)/(n1!·n2!·n3!) :
                    end if:
                end do:
            end do:
        end do:
    end do:

#make one only large vector with all the partitions together
with(combinat, partition) : with(ListTools) :

partitions := FlattenOnce([seq(partition(j), j = 1 ..partLength)]) :
h := numelems(partitions) :

#make the corresponding vector of Maya diagrams
 Maya = Array(1 ..h) :
 for i to h do
     r := numelems(partitions[i]) :
     Maya[i] := Array(1 ..r) :
     for j to r do
     Maya[i][j] := partitions[i][r − j + 1] − j + N + n + 2
     end do:
 end do:
 eqns := {e^4 = 0} :
 τ := 0 :
#compute the coordinates, the schur polynomial for the non zero coordinates and the tau function
Coordinates = Array(1 ..h) :
with(LinearAlgebra) : with(ArrayTools) : with(linalg) :
for i to h do
     r := numelems(Maya[i]) :
     increasingMaya := convert(FlipDimension(Maya[i], 2), list) :
         if Maya[i][1] < numRows then
     #this condition is needed for Maya diagrams corresponding to rows we did not compute
             Coordinates[i] := simplify(Determinant(SubMatrix(A, increasingMaya, [N + n + 1 − r
     + 1 ..N + n + 1])), eqns) :
         else
             Coordinates[i] := 0 :
         end if;
    if Coordinates[i] ≠ 0 then
         l := Array(1 ..r) :
         v := Vector(1 ..r) :
             for k to r do
                 l[k] := partitions[i][k] + (k − 1) :
                 v[k] := p[l[k]] :
             end do:
```

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        Wr := wronskian(v, X) :
        schur := det(Wr) :
        τ := τ + Coordinates[i]·schur :
    end if:
end do:
```

τ;

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$$\Big(\frac{1}{2} X Y^2 T + \frac{1}{2} Y T^2 + \frac{1}{6} X^3 Y T + \frac{1}{6} X^2 Y^3 + \frac{1}{12} X^4 Y^2 + \frac{1}{4} X^2 T^2 + \frac{1}{120} X^5 T + \frac{1}{72} X^6 Y$$

$$+ \frac{1}{1440} X^8 - \frac{1}{6} Y^4\Big) \Big(\frac{3}{8} e^3 + e^2\Big) + \Big(-\frac{1}{2} X Y^2 T + \frac{1}{24} X^4 Y^2 + \frac{1}{6} X^3 Y T + \frac{1}{4} X^2 T^2$$

$$- \frac{1}{24} X^5 T + \frac{1}{72} X^6 Y + \frac{1}{576} X^8 - \frac{1}{12} Y^4 - \frac{1}{6} X^2 Y^3 + \frac{1}{2} Y T^2\Big) \Big(-\frac{3}{2} e^3 - \frac{13}{4} e^2\Big)$$

$$+ \Big(\frac{1}{24} X^4 Y^2 + X Y^2 T - \frac{1}{20} X^5 T + \frac{1}{960} X^8 - \frac{1}{4} Y^4\Big) \Big(\frac{9}{4} e^3 + \frac{69}{16} e^2\Big) + \Big(\frac{1}{3} X^3 Y T$$

$$- \frac{1}{180} X^6 Y - \frac{1}{30} X^5 T + \frac{1}{720} X^8 - \frac{1}{3} X^2 Y^3 - \frac{1}{2} Y T^2 + \frac{1}{3} Y^4 - \frac{1}{4} X^2 T^2\Big) \Big(\frac{15}{4} e^3$$

$$+ \frac{127}{16} e^2\Big) + \Big(\frac{1}{4} Y^4 + \frac{1}{24} X^4 Y^2 - \frac{1}{2} X Y^2 T - \frac{1}{180} X^6 Y - \frac{1}{6} X^3 Y T + Y T^2$$

$$+ \frac{1}{2880} X^8 - \frac{1}{120} X^5 T + \frac{1}{2} X^2 T^2\Big) \Big(575 + \frac{333}{2} e^3 + \frac{1085}{2} e^2 + 888 e\Big) + \Big(-\frac{1}{72} X^6 Y$$

$$- \frac{1}{6} X^3 Y T + \frac{1}{12} X^4 Y^2 + \frac{1}{1440} X^8 + \frac{1}{120} X^5 T + \frac{1}{4} X^2 T^2 + \frac{1}{2} X Y^2 T - \frac{1}{6} Y^4$$

$$- \frac{1}{6} X^2 Y^3 - \frac{1}{2} Y T^2\Big) \Big(1729 + \frac{2115}{4} e^3 + 1599 e^2 + 2592 e\Big) + \Big(\frac{1}{2016} X^8 - \frac{1}{72} X^6 Y$$

$$+ \frac{1}{24} X^5 T + \frac{1}{12} X^4 Y^2 - \frac{1}{6} X^3 Y T - \frac{1}{6} X^2 Y^3 - \frac{1}{4} X^2 T^2 + \frac{1}{2} X Y^2 T + \frac{1}{6} Y^4$$

$$- \frac{1}{2} Y T^2\Big) \Big(2771 + \frac{3717}{4} e^3 + \frac{19875}{8} e^2 + 3906 e\Big) + \Big(\frac{1}{5760} X^8 - \frac{1}{144} X^6 Y + \frac{1}{30} X^5 T$$

$$+ \frac{1}{16} X^4 Y^2 - \frac{1}{3} X^3 Y T - \frac{1}{12} X^2 Y^3 + \frac{1}{4} X^2 T^2 - \frac{1}{24} Y^4 + \frac{1}{2} Y T^2\Big) \Big(3025 + 1113 e^3$$

$$+ \frac{21243}{8} e^2 + 3864 e\Big)$$

$$+ \frac{1}{32} \Big(3 \Big(-\frac{1}{2} Y^2 T + \frac{1}{6} X^3 Y^2 + \frac{1}{2} X^2 Y T + X T^2 - \frac{1}{24} X^4 T + \frac{1}{30} X^5 Y$$

$$+ \frac{1}{360} X^7\Big) e^2 (4 + e)\Big)$$

$$- \frac{1}{8} \Big(3 \Big(\frac{1}{12} X^3 Y^2 + \frac{1}{2} X^2 Y T + \frac{1}{120} X^5 Y - \frac{1}{8} X^4 T + \frac{1}{240} X^7 - \frac{1}{2} X Y^3$$

$$+ \frac{1}{2} Y^2 T\Big) e^2 (4 + e)\Big) + \Big(-\frac{1}{30} X^5 Y - \frac{1}{2} X^2 Y T + \frac{1}{6} X^3 Y^2 + \frac{1}{360} X^7 - \frac{1}{24} X^4 T$$

$$+ X T^2 - \frac{1}{2} Y^2 T\Big) \Big(-444 - \frac{1013}{16} e^3 - \frac{1113}{4} e^2 - 571 e\Big) + \Big(\frac{1}{6} X^3 Y^2 + \frac{1}{360} X^7$$

$$- \frac{1}{20} X^5 Y - \frac{1}{3} X Y^3 + Y^2 T + \frac{1}{12} X^4 T - \frac{1}{2} X T^2 \Big) \left(-840 - \frac{283}{2} e^3 - 516 e^2 - 1018 e \right)$$

$$+ \left(\frac{1}{840} X^7 - \frac{1}{30} X^5 Y + \frac{1}{8} X^4 T + \frac{1}{6} X^3 Y^2 - \frac{1}{2} X^2 Y T - \frac{1}{2} Y^2 T \right) \Big(-966 - \frac{3073}{16} e^3$$

$$- \frac{2373}{4} e^2 - \frac{2107}{2} e \Big)$$

$$+ \frac{3 \left(\frac{1}{4} X^2 Y^2 + X Y T + \frac{1}{24} X^4 Y + T^2 - \frac{1}{6} X^3 T + \frac{1}{144} X^6 - \frac{1}{2} Y^3 \right) e^2}{16} + \Big(\frac{1}{2} Y^3$$

$$- \frac{1}{24} X^4 Y - X Y T + \frac{1}{4} X^2 Y^2 + \frac{1}{144} X^6 - \frac{1}{6} X^3 T + T^2 \Big) \left(85 + \frac{15}{4} e^3 + \frac{63}{2} e^2 + 90 e \right)$$

$$+ \left(\frac{1}{4} X^2 Y^2 + \frac{1}{80} X^6 - \frac{1}{8} X^4 Y - \frac{1}{2} Y^3 \right) \left(239 + 15 e^3 + \frac{711}{8} e^2 + 240 e \right) + \Big(\frac{1}{144} X^6$$

$$- \frac{1}{8} X^4 Y + \frac{1}{3} X^3 T + \frac{1}{6} Y^3 + \frac{1}{4} X^2 Y^2 - \frac{1}{2} T^2 \Big) \left(301 + \frac{105}{4} e^3 + \frac{939}{8} e^2 + 270 e \right)$$

$$+ \left(\frac{1}{2} X Y^2 + \frac{1}{24} X^5 - \frac{1}{2} X^2 T - \frac{1}{6} X^3 Y - Y T \right) \left(-60 - 47 e - \frac{21}{2} e^2 - \frac{5}{8} e^3 \right)$$

$$+ \left(\frac{1}{30} X^5 - \frac{1}{3} X^3 Y + Y T + \frac{1}{2} X^2 T \right) \left(-90 - \frac{125}{2} e - \frac{75}{4} e^2 - \frac{35}{16} e^3 \right) + \Big(Y^2$$

$$+ \frac{1}{12} X^4 - X T \Big) \left(11 + 6 e + \frac{3}{8} e^2 \right) + \left(\frac{1}{8} X^4 - \frac{1}{2} Y^2 - \frac{1}{2} X^2 Y \right) \left(25 + 12 e + \frac{15}{8} e^2 \right)$$

$$+ \left(\frac{X^3}{3} - T \right) \left(-6 - \frac{3 e}{2} \right) + Y + \frac{X^2}{2}$$

$t := (X, Y, T) \rightarrow \tau :$

#Hirota bilinear form (c,d=0)

$\tau x := diff(t(X, Y, T), X) :$
$\tau xx := diff(\tau x, X) :$
$\tau xxx := diff(\tau xx, X) :$
$\tau xxxx := diff(\tau xxx, X) :$
$\tau t := diff(t(X, Y, T), T) :$
$\tau xt := diff(\tau x, T) :$
$\tau y := diff(t(X, Y, T), Y) :$
$\tau yy := diff(\tau y, Y) :$

$Hirota := simplify\left(\left(\tau xxxx \cdot \tau - 4 \cdot \tau xxx \cdot \tau x + 3\, \tau xx^2 \right) + 4 \cdot \left(\tau x \cdot \tau t - \tau \cdot \tau xt \right) + 3 \cdot \left(\tau \cdot \tau yy - \tau y^2 \right), eqns \right);$

=

$$\frac{1}{9676800} \left(53180287731 e^3 + 62180312507 e^2 + 46032402864 e + 16418043360 \right) X^{12}$$

$$+ \frac{1}{9676800} \left(-77163444234 e^3 - 99482565672 e^2 - 80581073088 e - 31270245120 \right) X^{11}$$

$$+ \frac{1}{9676800} \Big((-497616372972 Y + 56353321800) e^3 + (-575651421072 Y$$

$$+ 80648566482) e^2 + (-428084436672 Y + 72129873600) e - 156321532800 Y$$

$$+ 30860300160) X^{10} + \frac{1}{9676800} ((-2947858256880 T + 465374164440 Y$$
$$- 17567149560) e^3 + (-3481930339080 T + 590285242080 Y - 27504684000) e^2 + ($$
$$-2582468530560 T + 480231649920 Y - 27305630400) e - 910151043840 T$$
$$+ 191998886400 Y - 13322545920) X^9 + \frac{1}{9676800} ((2724929893260 Y^2 + 3206793777570 T$$
$$- 248896132560 Y - 2950598880) e^3 + (3197656355220 Y^2 + 4182645512520 T$$
$$- 350065468260 Y - 6727477680) e^2 + (2383906092480 Y^2 + 3396337983360 T$$
$$- 314400251520 Y - 8007465600) e + 857150703360 Y^2 + 1301466216960 T$$
$$- 138493491840 Y - 3725398080) X^8 + \frac{1}{9676800} ((-986989778640 Y^2 + ($$
$$-5322428611200 T + 117764808480) Y - 1120691039040 T + 2755198080) e^3 + ($$
$$-1311041574720 Y^2 + (-6190198225920 T + 190153802880) Y - 1633576053600 T$$
$$+ 6592043520) e^2 + (-1076102208000 Y^2 + (-4758550778880 T + 190960289280) Y$$
$$- 1463737236480 T + 8883417600) e - 410288302080 Y^2 + (-1835073792000 T$$
$$+ 91423365120) Y - 612169021440 T + 5135616000) X^7 + \frac{1}{9676800} ((14772789511200 Y^3$$
$$- 1415300402880 Y^2 + (1675466205840 T - 50175780480) Y + 73298837183040 T^2$$
$$- 321575985360 T) e^3 + (17060419561920 Y^3 - 1997500009680 Y^2 + (2067938994240 T$$
$$- 96887992320) Y + 86028145338240 T^2 - 530832294720 T) e^2 + (12756782062080 Y^3$$
$$- 1785620712960 Y^2 + (1828388782080 T - 110920320000) Y + 64328998970880 T^2$$
$$- 538586012160 T) e + 4723982592000 Y^3 - 777963755520 Y^2 + (864757555200 T$$
$$- 57644536320) Y + 23264245509120 T^2 - 255577835520 T) X^6 + \frac{1}{9676800} (($$
$$-16348763249280 Y^3 + (-186172678419840 T + 1547421926400) Y^2 + (6470387360640 T$$
$$+ 7607355840) Y - 39351779691840 T^2 + 226134840960 T) e^3 + (-20653944675840 Y^3 + ($$
$$-217383696734400 T + 2489147781120) Y^2 + (9363878959680 T + 18681788160) Y$$
$$- 51021650131200 T^2 + 430600302720 T) e^2 + (-16852226872320 Y^3 + ($$
$$-162327095884800 T + 2493077045760) Y^2 + (8386191636480 T + 25077427200) Y$$
$$- 41665700160000 T^2 + 493720012800 T) e - 6823711641600 Y^3 + (-58937456148480 T$$
$$+ 1194165504000) Y^2 + (3530806917120 T + 14224896000) Y - 16287325931520 T^2$$
$$+ 260517841920 T) X^5 + \frac{1}{9676800} ((29762359880400 Y^4 + 4310464636800 Y^3$$
$$+ (109241417048400 T - 294230361600) Y^2 + (518857706505600 T^2 - 5000496530400 T) Y$$
$$- 966236040000 T^2 + 24456146400 T) e^3 + (36376344925200 Y^4 + 5776411888800 Y^3$$
$$+ (140342057352000 T - 519900595200) Y^2 + (604971577224000 T^2 - 8055328176000 T) Y$$
$$- 1355169916800 T^2 + 55420848000 T) e^2 + (27099598982400 Y^4 + 5152997606400 Y^3$$
$$+ (114444392832000 T - 581928883200) Y^2 + (452813232614400 T^2 - 8104784486400 T) Y$$
$$- 1289341670400 T^2 + 73703347200 T) e + 9125352230400 Y^4 + 2409299020800 Y^3$$
$$+ (45155219558400 T - 323604288000) Y^2 + (165784631040000 T^2 - 3888447897600 T) Y$$

$$
\begin{aligned}
& - 613209139200\,T^2 + 43835904000\,T\Big)\,X^4 + \frac{1}{9676800}\,\Bigg(\Big(-824960656800\,Y^4 + (\\
& -448422512832000\,T + 113382864000)\,Y^3 + (-1811159481600\,T - 141176044800)\,Y^2 + \Big(\\
& -211593344860800\,T^2 + 401294476800\,T\Big)\,Y - 431513479353600\,T^3 + 1181216131200\,T^2\Big)\,e^3 \\
& + \Big(-2370656937600\,Y^4 + (-529716309696000\,T + 375588057600)\,Y^3 + (-2462621616000\,T \\
& - 330873984000)\,Y^2 + \Big(-272314695744000\,T^2 + 685436774400\,T\Big)\,Y - 512283569817600\,T^3 \\
& + 2127746880000\,T^2\Big)\,e^2 + \Big(-1933593984000\,Y^4 + (-395571385036800\,T \\
& + 430175692800)\,Y^3 + (-2004316876800\,T - 445277952000)\,Y^2 + \Big(-222270676992000\,T^2 \\
& + 771163545600\,T\Big)\,Y - 380953514188800\,T^3 + 2167206451200\,T^2\Big)\,e - 146526105600\,Y^4 \\
& + (-141609000960000\,T + 124211404800)\,Y^3 + (-766557388800\,T - 260692992000)\,Y^2 \\
& + \Big(-87787929600000\,T^2 + 444300595200\,T\Big)\,Y - 133715648102400\,T^2\,\left(T - \frac{385}{54834}\right)\Bigg)\,X^3 \\
& + \frac{1}{9676800}\,\Big(\Big(244039589640000\,Y^5 - 24001712380800\,Y^4 + (117745511889600\,T \\
& + 1034012044800)\,Y^3 + \Big(1367631313977600\,T^2 - 5934135816000\,T\Big)\,Y^2 \\
& + \Big(15785595705600\,T^2 - 90932284800\,T\Big)\,Y + 91209418977600\,T^3 + 1371893241600\,T^2\Big)\,e^3 \\
& + \Big(285401026713600\,Y^5 - 34050758767200\,Y^4 + (155718996652800\,T + 1906423948800)\,Y^3 \\
& + \Big(1616849183980800\,T^2 - 9731581574400\,T\Big)\,Y^2 + \Big(22669389388800\,T^2 \\
& - 223802611200\,T\Big)\,Y + 123385684665600\,T^3 + 2398388227200\,T^2\Big)\,e^2 \\
& + \Big(213236576179200\,Y^5 - 30687789081600\,Y^4 + (126528456499200\,T + 2163519590400)\,Y^3 \\
& + \Big(1205348043110400\,T^2 - 9822232627200\,T\Big)\,Y^2 + \Big(20495520460800\,T^2 \\
& - 300929126400\,T\Big)\,Y + 99524615500800\,T^3 + 2704181760000\,T^2\Big)\,e + 77533182720000\,Y^5 \\
& - 13472689305600\,Y^4 + (47767781376000\,T + 1165677004800)\,Y^3 + \Big(429045158707200\,T^2 \\
& - 4662862848000\,T\Big)\,Y^2 + \Big(8849569075200\,T^2 - 170698752000\,T\Big)\,Y + 35406578995200\,T^3 \\
& + 1526157158400\,T^2\Big)\,X^2 + \frac{1}{9676800}\,\Bigg(\Big(-41350905993600\,Y^5 + (-1100892777465600\,T \\
& + 4203206985600)\,Y^4 + (25580057126400\,T + 29234822400)\,Y^3 + \Big(-364572457804800\,T^2 \\
& + 2576397196800\,T\Big)\,Y^2 + \Big(-1159567443417600\,T^3 + 825138316800\,T^2\Big)\,Y \\
& - 21669727564800\,T^3 + 288493228800\,T^2\Big)\,e^3 + \Big(-53477545766400\,Y^5 + (\\
& -1298923285161600\,T + 6844562726400)\,Y^4 + (37288113004800\,T + 73200153600)\,Y^3 + \Big(\\
& -476260665753600\,T^2 + 4878072460800\,T\Big)\,Y^2 + \Big(-1369514018880000\,T^3
\end{aligned}
$$

$$+ 1390933555200\, T^2)\, Y - 31117547865600\, T^3 + 658714291200\, T^2)\, e^2 + ($$

$$-43486329600000\, Y^5 + (-964904916326400\, T + 6873706828800)\, Y^4 + (33370212556800\, T$$

$$+ 100309708800)\, Y^3 + (-388772649216000\, T^2 + 5583242649600\, T)\, Y^2 + ($$

$$-1018816546406400\, T^3 + 1424231424000\, T^2)\, Y - 28426567680000\, T^3 + 884440166400\, T^2)\, e$$

$$- 16968268800000\, Y^5 + (-342103774924800\, T + 3260404224000)\, Y^4 + (13937572454400\, T$$

$$+ 56899584000)\, Y^3 + (-150170659430400\, T^2 + 2956165632000\, T)\, Y^2$$

$$- 361393643520000 \left(T - \frac{23}{12350}\right) T^2\, Y - 12465886003200 \left(T - \frac{755}{17892}\right) T^2)\, X$$

$$+ \frac{1}{9676800} (396345125332800\, Y^6 - 30148255468800\, Y^5 + (241920947872800\, T$$

$$+ 732618432000)\, Y^4 + (1943324739417600\, T^2 - 23202575625600\, T)\, Y^3 + ($$

$$-3723965280000\, T^2 + 290469110400\, T)\, Y^2 + (289157253840000\, T^3 - 4474636992000\, T^2)\, Y$$

$$+ 221478985324800\, T^4 + 820009008000\, T^3)\, e^3 + \frac{1}{9676800} (466542495921600\, Y^6$$

$$- 43843222382400\, Y^5 + (312501759696000\, T + 1385527852800)\, Y^4$$

$$+ (2258995262227200\, T^2 - 37940562777600\, T)\, Y^3 + (-3436270387200\, T^2$$

$$+ 661392345600\, T)\, Y^2 + (368543417356800\, T^3 - 8353058515200\, T^2)\, Y$$

$$+ 258182843990400\, T^4 + 1475738611200\, T^3)\, e^2 + \frac{1}{9676800} (347172061824000\, Y^6$$

$$- 39442298112000\, Y^5 + (254653652736000\, T + 1586598451200)\, Y^4$$

$$+ (1694134542643200\, T^2 - 38198355148800\, T)\, Y^3 + (-3532941619200\, T^2$$

$$+ 884440166400\, T)\, Y^2 + (303220060416000\, T^3 - 9531609292800\, T^2)\, Y$$

$$+ 192682138521600\, T^4 + 1455090739200\, T^3)\, e + \frac{38427136}{3}\, Y^6 - 1725849\, Y^5$$

$$+ \frac{1}{9676800} (99658227916800\, T + 840463948800)\, Y^4 + \frac{1}{9676800} (624656793600000\, T^2$$

$$- 18057373286400\, T)\, Y^3 + \frac{1}{9676800} (-2682176716800\, T^2 + 526030848000\, T)\, Y^2$$

$$+ \frac{1}{9676800} (123134764032000\, T^3 - 5100699340800\, T^2)\, Y + 7282548 \left(T + \frac{1}{117}\right) T^3$$